Remarks

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Thus, claim 1 has been amended to incorporate the subject matter of claim 5, as a result of which claim 5 has been cancelled; and has also been amended to recite "a stretched single layer". The feature that the porous hollow fiber of the present invention comprises a single layer of vinylidene fluoride resin is believed clear from the fact that throughout the specification, including all the working examples, no application step or laminate layer forming step is included. The "stretched" aspect of the single layer is apparent from the fact that, as indicated in original claim 8, the process includes a stretching step.

Claim 7 has been amended to incorporate the subject matter of claim 8, which has therefore been cancelled; and also to incorporate the subject matter of claim 5.

The rejection of claims 1-8 under the first paragraph of 35 U.S.C. §112 is respectfully traversed.

The Examiner apparently bases this rejection on her argument that the specification does not provide the bases for varying process steps, or composition to achieve the claimed membrane properties. However, to the contrary, the process steps and composition are clearly recited in the specification, for example, beginning at page 9, line 5, which includes a discussion of the vinylidene fluoride resin, plasticizer, solvent, mixing and melt-extrusion, cooling, extraction, stretching, heat treatment and elution liquid treatment. The Examiner has not offered any evidence or reasoning to support why one of ordinary skill in the art, following the teachings of the present application, would not be able to produce the claimed porous hollow fiber having the recited properties. Furthermore, as shown by the working examples in the specification, and the results in Table 1 on page 25, the art-skilled are clearly enabled to produce the porous hollow fiber having the recited properties.

For these reasons, Applicants take the position that the rejection of the claims under the first paragraph of 35 U.S.C. §112 should be withdrawn.

The rejection of claims 1-8 under the second paragraph of 35 U.S.C. §112 is also respectfully traversed.

The Examiner states that it is unclear whether Applicants intend to claim a hollow fiber with a variable permeation, e.g. pore size or diameter through the membrane length, and if so, it

is unclear how these conditions are obtained by the process of claim 7. However, requirement (c) of claim 1 specifies that the relation between basic permeability F_0 and the average pore diameter P is $F_0/P \geqq 300$. Requirement (c) is discussed on page 8 of the specification. As indicated therein, the water permeation rate through the membrane increases as the pore diameter increases at an equal number of pores, whereas the pore diameter is restricted depending on the object to be separated. Given these considerations, the ratio of F_0/P is at least 300. One of ordinary skill in the art would be able to determine whether or not a particular porous hollow fiber satisfies requirement (c), i.e. falls within the scope of claim 1 in this regard, and therefore, Applicants take the position that the claims are not indefinite under the second paragraph of 35 U.S.C. §112.

The patentability of the presently claimed invention over the disclosures of the references relied upon by the Examiner in rejecting the claims will be apparent upon consideration of the following remarks.

The present invention is directed to a porous hollow fiber of vinylidene fluoride resin (claim 1) and a process for production thereof (claim 7).

The porous hollow fiber of the present invention comprise a single layer of vinylidene fluoride resin, and yet exhibits excellent mechanical strength and also excellent water filtration performance as represented by requirements (a) — (d) recited in claim 1. The meanings of the requirements (a) — (d) are explained below.

Thus, the porous hollow fiber of the present invention is characterized by:

(b) a large basic water permeability F_0 (i.e., a water permeability extrapolated to a test length of 0),

(c) a large ratio F_0/P with respect to an average pore diameter P determining an effectively removable particle diameter,

(a) an average slope C of $-20 \leqq C$ representing a small decrease in water permeability F at an increased length L with respect to F_0, and

(d) a suppressed outer diameter so as not to decrease the lower volume efficiency when formed into a water filtration module.

The porous hollow fiber of the present invention is also provided with excellent mechanical strength attained by stretching, which is also effective for increasing the water permeability of the porous hollow fiber.

The smooth stretching of an extruded-and-solidified hollow fiber of vinylidene fluoride resin is principally attributable to the use of a blend of two vinylidene fluoride resins, i.e., a smaller portion of a first vinylidene fluoride resin of an ultra-high molecular weight (Mw1) and a larger proportion of a second vinylidene fluoride resin of a medium-to-high molecular weight (Mw2), now recited in amended claims 1 and 7.

The rejection of claims 1-7 under 35 U.S.C. §102(b) or 35 U.S.C. §103(a) as being unpatentable over Takamura et al. (US '773) is respectfully traversed.

Takamura et al. has been cited principally because of the disclosed outer diameter (abstract and column 2, lines 15-68) and its reference to the possibility of stretching (column 7, lines 17-20). This is questionable.

In the abstract, an inner diameter range of 1.5 - 5 mm and a wall thickness range of 0.5- 2 mm are disclosed. This possibly provides a maximum outer diameter range of 1.5-5 mm + (0.5-2 mm) x 2 = 2.5-9 mm, which slightly overlaps with (d) the outer diameter arrange of at most 3 mm recited in the instant claim 1. However, the actually disclosed outer diameter is only 3.6 mm in all the Examples.

Takamura et al. refer to the possibility of stretching (column 7, lines 17-20), but fail to disclose or suggest how the stretching is performed with no actual practice of stretching at all. Moreover, Takamura et al. clearly fail to teach or suggest the use of a blend of two vinylidene fluoride resins, i.e., a smaller portion of a first vinylidene fluoride resin of an ultra-high molecular weight (Mw1) and a larger proportion of a second vinylidene fluoride resin of a medium-to-high molecular weight (Mw2), which blend has been adopted in the present invention for facilitating the stretching.

Accordingly, the porous hollow fiber of the present invention obtained through stretching of such a specific blend of vinylidene fluoride resins is not believed to be anticipated by or obvious over Takamura et al., even without further discussion on the water filtration performance represented by the requirements (a) – (c) in the instant claim 1.

The rejection of claim 7 based on the Takamura et al. reference has been rendered moot, since the subject matter of claim 8, which is not subject to the rejection based on this reference, has been incorporated into claim 7.

The rejection of claims 1-3 and 6 under 35 U.S.C. §103(a) as being unpatentable over Nohmi et al. (US '035) has been rendered moot, in view of the fact that as indicated above, the

subject matter of claim 5, which is not subject to this rejection, has been incorporated into claim 1.

Similarly, the rejection of claims 1-3 and 6 under 35 U.S.C. §103(a) as being unpatentable over Morikawa et al. (US '914) has been rendered moot, for the same reason, i.e. the subject matter of claim 5, not subject to this rejection, has been incorporated into claim 1.

The Examiner has also provisionally rejected claims 1-8 for obviousness-type double patenting as being unpatentable over claims 1-5 of Serial No. 11/578,425, and has provisionally rejected claims 1-8 for obviousness-type double patenting as being unpatentable over claims 1-4, 6-7, 10 and 11 of Serial No. 11/629,350. The Examiner is kindly requested to hold both of these double patenting rejections in abeyance, pending an indication that the claims of the present application are otherwise in condition for allowance.

Therefore, in view of the foregoing amendments and remarks, it is submitted that each of the grounds of rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

Respectfully submitted,

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